

<p>2000-679290/66 A17 E19 BADI 1999.03.29 BASF AG 1999.09.11 1999-1043544(+1999US-277823) (2000.10.05) C07F 11/00, B01J 31/18, C07C 2/32, 29/16 New olefin oligomerization catalyst, useful for making oligomers for oxo-alcohol production, comprises chromium compound, triazacyclohexane ligand and activator (Ger) C2000-206455 N(CN JP KR SG US) R(AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE) Addnl. Data: MAAS H, MIHAN S, KOEHN R, SEIFERT G, TROPSCH J 2000.03.25 2000WO-EP02660, 1999.05.14 1999DE-1022048, 1999.09.11 1999DE-1043544</p>	<p>A(2-A6C, 4-G1A) E(5-E, 5-L3B, 10-J2C1)</p> <p>(b) at least one activator (II). (I) has formula CrX₃ and L has formula (VII).</p> <div data-bbox="617 588 925 1029"> <p>(VII)</p> </div> <p>X = abstractable counterion; and R¹-R⁹ = hydrogen, organosilicon group or optionally substituted 1-30C organic group, and two geminal or vicinal R groups may together complete a 5- or 6-membered ring.</p> <p>INDEPENDENT CLAIMS are also included for the following:</p>
<p><u>NOVELTY</u> Oligomerization catalyst (A) for olefins comprises: (a) a chromium compound (I) and a ligand (L), or a preformed (I)-L complex; and (b) at least one activator (II).</p> <p><u>DETAILED DESCRIPTION</u> Oligomerization catalyst (A) for olefins comprises: (a) a chromium compound (I) and a ligand (L), or a preformed (I)-L complex; and</p>	<p>WO 200058319-A+</p>

- (a) preparation of oligomers (III) of up to 30C by reacting at least one olefin at 0-150°C and 1-200 bar in presence of (A);
- (b) (III) produced this way;
- (c) oxo-alcohols (IV) produced from (III) by conventional hydroformylation; and
- (d) New compounds (1,3,5-tris(2-alkyl-substituted alkyl)-1,3,5-triazacyclohexane)CrCl₃ (V).

USE

(A) is used to make olefin oligomers (III) of up to 30C. These are used (i) to prepare oxo-alcohols (IV) by conventional hydroformylation and (ii) as copolymers for plastics. (IV) are components of surfactants and plasticizers for polymers.

ADVANTAGE

(A) are stable, can be produced inexpensively and have better activity and selectivity for low molecular weight oligomers. Practically no products larger than 500 D are formed.

SPECIFIC COMPOUNDS

The compound [(1,3,5-tris(2-n-propylheptyl)-1,3,5-triazacyclohexane)CrCl₃] is claimed.

EXAMPLE

An autoclave, flushed with argon, was charged with 14.5 mg of (1,3,5-tri-n-octyl-1,3,5-triazacyclohexane)chromium(III) chloride complex in 25 ml heptane and 14.3 mg 2,5-dimethylpyrrole in 10 ml heptane. The reactor was flushed three times with ethylene, then 0.75 ml of 1M aluminum triethyl in n-hexane added and ethylene introduced to 25 bars. The mixture was heated to 80°C (40 bars) and maintained under these conditions, with stirring, for 2 hours. After cooling and venting, the reaction mixture was treated with 1 ml water (to destroy the catalyst), then insolubles filtered off, dried and weighed. The yield of oligomers was 18.6 kg per g of chromium in the catalyst and product distribution was (by weight) hexene 44.4%; decene 33.1%; tetradecene 10.9% and 'polymer' 1.5%.

DEFINITIONS

Preferred Definitions:

R¹, R² and R³ = 1-12C alkyl, 6-15C aryl or 6-8C aralkyl;

other R = H or methyl;

X = Cl or tosylate

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2000-679290/66	<p data-bbox="560 1528 584 1801">TECHNOLOGY FOCUS</p> <p data-bbox="587 1060 730 1801">Organic Chemistry - Preferred Catalysts: (II) is a mixture of: (i) an optionally substituted 5-membered aromatic nitrogen heterocycle and an aluminum alkyl (VI) in which alkyl groups may be partially replaced by halo and/or alkoxy or (ii) a boron compound and (VI). Alkylaluminum compounds may also be used as (II). Especially preferred catalysts comprise: (a) (1,3,5-tris(n-octyl or benzyl)-1,3,5-triazacyclohexane)CrCl₃; (b) 2,5-dimethylpyrrole and (c) Et₃Al or EtAlCl₂. Preparation: The (I)-L complex is formed by simple reaction, in solution or suspension. Polymers - Preferred Process: Oligomerization is performed in the presence of, per kg reaction mixture, 10⁻⁷ to 1, especially 10⁻⁵ to 10⁻² moles (I), or its complex; 10⁻⁸ to 100, especially 10⁻⁵ to 0.05, moles N-heterocycle and 10⁻⁸ to 500, preferably 0.5 × 10⁻⁵ to 0.5, moles (VI), with mole ratios 1:1-5:5-50. Oligomerization is in usual solvents, generally hydrocarbons, at 1-120, preferably 70-110 °C and 3-120 bar, and is performed continuously or batchwise. The oligomers are</p> <p data-bbox="555 352 646 1033">generally recovered by distillation. The most preferred reaction is trimerization of ethylene. (35pp1251DwgNo.0/0)</p>
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